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United States  
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Agriculture

Soil  
Conservation  
Service

Cooperating  
Agencies

# **FLOOD PLAIN MANAGEMENT**

**A Study Of South Fork  
Shenandoah Tributaries**

**Rockingham County, Virginia**

**APPENDIX III**

**CUB RUN – BIG RUN**

**August 1983**

AD-33 Bookplate  
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## FOREWORD

The main report on the Flood Plain Management Study of South Fork Shenandoah River Tributaries provides information and data needed for use by administrators and the general public. Discussion of findings and recommendations relevant to the total study area are included.

Eight appendixes or technical reports include specifics on each tributary as listed below. Tables, flood profiles and area-flooded photomaps provide information for user agencies and individuals to make technical decisions and to comply with regulations related to the use of flood plains.

Appendix I	Stony Run
Appendix II	Quail Run - Boone Run
Appendix III	Cub Run - Big Run
Appendix IV	Naked Creek
Appendix V	Dry Run
Appendix VI	Hawksbill Creek
Appendix VII	Mill Creek - Congers Creek
Appendix VIII	Pleasant Run

Appreciation is extended to those who contributed their active interest, cooperation, and information to this project.

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 Cub Run - Big Run

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APPENDIX III  
South Fork Shenandoah River Tributaries  
FLOOD PLAIN MANAGEMENT STUDY  
Technical Report  
CUB RUN - BIG RUN  
Rockingham County, Virginia

INTRODUCTION

This technical report on Cub Run - Big Run is one of nine such appendixes to the Flood Plain Management Study on South Fork Shenandoah River Tributaries. The main report includes items such as authorities, responsibilities, scope, procedures, description, recommendations, and data common to the tributaries and relevant to the total project.

The first sections of this appendix present general information pertinent to the study on Cub Run - Big Run. Included are brief discussions of natural values, alternate solutions to the flood problems, and suggested items for the flood plain management program. The last section contains data and exhibits needed to make technical decisions for regulation and use of the flood plain.

DESCRIPTION OF STUDY AREA

Upstream Drainage Area

The Cub Run - Big Run drainage area is comprised of 27.2 square miles from Cub Run and 14.2 square miles from Big Run. These streams empty into the South Fork Shenandoah River at the same point; with Cub Run to the west of the river and Big Run to the east. The Shenandoah River is a subbasin of the Potomac River which is in the Mid-Atlantic Region as designated by the Water Resources Council. The USGS Hydrologic Unit code number in the area is 02070005. The watershed is in the Appalachian Ridges and Valleys physiographic province. Soils in the Cub Run drainage area are formed in residuum of limestone, dolomite and calcareous shale. Frederick-Lodi-Rock Outcrop and Chilhowie-Edom are the predominant soil associations. There is also a small drainage area near U. S. High 33 of soil formed in residuum of shale and thin interbedded sandstone and limestone. Berks-Sequoia-Weikert is the predominant soil association in this area. Soils in the Big Run drainage area are formed in residuum of dominantly sandstone, shale or greenstone and colluvial material from these areas. Drall-Laidig and Sylco-Myersville-Fauquier are the predominant soil associations. Land use for Cub Run is about 35 percent woods, 32 percent pasture, 28 percent cropland; with the remaining 4 percent farmsteads, roads, and rural built-up areas. Big Run is about 77 percent woods, 17 percent cropland or pasture, and 6 percent farmsteads, roads or rural built-up.

## Flood Plain

The study area includes the flood plain along 13 miles of Cub Run, which extends from the junction at South Fork Shenandoah River to State Route 620, and 1½ miles of Big Run. Land use in the Cub Run flood plain is about 35 percent woods, 45 percent pasture, hay or idle land, 15 percent crop and 5 percent miscellaneous. In the flood plain of Big Run, land use is about 50 percent woods and 50 percent hay or pasture. About 6 bridges and 11 dwellings on Cub Run and 3 dwellings on Big Run would be subject to varying amounts of damage during extreme floods.

## Natural and Beneficial Flood Plain Values

Cub Run is a warm to cool mountain valley stream with limited game and good non-game fish populations. This stream is too small to support good fishable populations. Stream bank erosion and sedimentation occurs on this stream. Bank stabilization and establishment of stream borders would help improve aquatic and terrestrial habitats. Big Run supports wild or "put and take" trout populations, primarily in its headwaters. Big Run is mostly in wooded cover which provides good habitat for fish and wildlife populations. Practices that maintain this forest cover would be the best way to preserve this high natural value. Neither of these streams contain any known nationally threatened or endangered species, or significant wetlands. Two important fish species that occur in the Potomac River drainage of which these streams are a part, are possible inhabitants of some of these streams. These are the Pearl Dace, *Semotilus Margarita*, and the Slimy Sculpin, *Cottus Cognatus*. These fish were recognized by the Endangered Species Symposium at Virginia Polytechnic Institute and State University at Blacksburg in May, 1979 as being of "special concern" to the State of Virginia.

## FLOOD HISTORY

Cub Run heads in the Massanutten Mountain and the downstream communities of Keezletown and Penn Laird receive frequent damage from flooding, as do several secondary roads. U. S. Highway 33 will be damaged by high flows. The majority of the agricultural land, at the present time, is in pasture. This is due to the constant flood hazard. Annual damages in this tributary will amount to an estimated \$50,000 to \$75,000 annually. The areas most likely to be affected by flooding on Big Run are 2 or 3 rural homes and U. S. Highway 340. Annual damages are estimated to be \$4,000 to \$6,000.

## FLOOD POTENTIAL

### Present Conditions

Extreme floods would inundate about 360 acres in Cub Run and 100 acres in Big Run. (See table below) Velocities would average about 4.5 feet

per second and exceed six feet per second in some reaches. Out-of-bank stages would range from about three to twelve feet. Duration of flooding would seldom exceed six hours except during storms of intense and prolonged rainfall. Varying amounts of damage would occur to the 12 dwellings and six buildings.

<u>Type of Damage</u>	<u>Acres Inundated</u>	
	<u>100-year flood</u>	<u>500-year flood</u>
	<u>Cub Run</u>	<u>Cub Run</u>
Pasture and Woods	256	288
Cropland	48	54
Miscellaneous	16	18
	<u>320</u>	<u>360</u>
	<u>Big Run</u>	<u>Big Run</u>
Pasture and Woods	36	50
Cropland	36	50
Miscellaneous	8	10
	<u>80</u>	<u>110</u>

Limitations on Use of Data. The flood elevations given in this report should be considered as minimum elevations. During floods, uprooted trees and other debris may collect on bridges and culverts and clog the channels. Such obstructions increase the depth and extent of flooding. Analyses were made without showing the effects of potential obstructions. Also, extremely rare events such as dam failure and climatic changes were not analyzed.

#### Future Conditions

The hydrologic conditions in the upstream areas are expected to improve as farmers and foresters continue to apply good management and conservation practices. This improvement is expected to reduce runoff approximately to the extent that additional development will increase runoff. Therefore, the flood hazard and damage potential is not expected to change significantly in the next 5 to 10 years. However, if a dependable water supply and sanitary sewers are provided, development could occur rapidly. Significant development could increase flood flows by 5 to 10 percent.

#### FLOOD PLAIN MANAGEMENT

The main report includes a discussion of existing programs, current regulations, availability of flood insurance, recommendations, and related items relevant to the total study. The items discussed below relate only to Cub Run - Big Run.

Floodway. The data for a "first trial" or computed floodway is filed with the basic data for Cub Run - Big Run. The results indicate that hazardous conditions of depth and/or velocity prevail at current 100-year flood levels in all reaches, and that generally no additional encroachment should be allowed. The data can be used as a basis for further study of local measures, but it is suggested that no continuous or extensive floodway be considered.



## Recommendations

In preparation of their comprehensive flood management program, the local sponsors should implement the following recommendations on Cub Run - Big Run:

- Monitor future developments in the watershed to assure that regulations are followed so as not to increase the flood hazard;
- Assist landowners in studies of local protection measures to reduce streambank erosion and the spread of floodwaters; and
- Encourage the re-establishment of natural vegetation in the flood plain to restore the fish and wildlife habitat.

## Evaluation of Potential

The potential for reducing the flood hazard on Cub Run - Big Run is limited by the relatively low value of damages from flooding. Yet, the damages are great enough that the "do-nothing" alternate does not warrant serious consideration.

Conversely, a brief study of contour maps indicates that flood control dams could not be economically justified. On the steep gradients, construction costs added to the costs of land rights would be excessive when related to resultant benefits.

Hydrologic conditions under current land use and management practices are generally good to excellent. An improved conservation use-and-land treatment only program would provide only limited reductions in runoff and flood stages.

A program of flood proofing individual homes could be of benefit.

These observations apply generally to all the study tributaries as do the recommendations listed in the main report. The primary opportunities have to do with prohibition of future construction or other encroachment in the flood plains; and with other regulations needed to avoid increased runoff and to minimize flood damages.

## TECHNICAL DATA AND EXHIBITS

This section provides the data and exhibits needed by user agencies and individuals to make technical decisions and to comply with regulations on use of the flood plain on Cub Run - Big Run.

The index map shows the area covered by the individual photomaps. Flood hazard photomaps show the area inundated by the 100 and 500-year floods. Where only one line is shown, there is no significant difference in the boundaries of the two flood areas. These photomaps should only be used to determine approximate flood elevations; they are based on semicontrolled mosaics and the boundaries shown may vary from the location on the ground.

Flood profile plates provide elevations of the 10, 50, 100 and 500-year floods at any location along the length of the streams. The elevations and discharges of the 10, 25, 50, 100 and 500-year flood at each surveyed cross section are given in Table CR-1. Sample cross sections illustrated how the flood area boundaries were located. Table CR-2 provides the description and elevation of benchmarks which are located on the photomaps.

Table CR-1 can be used to locate flood elevations on the ground at surveyed cross sections.

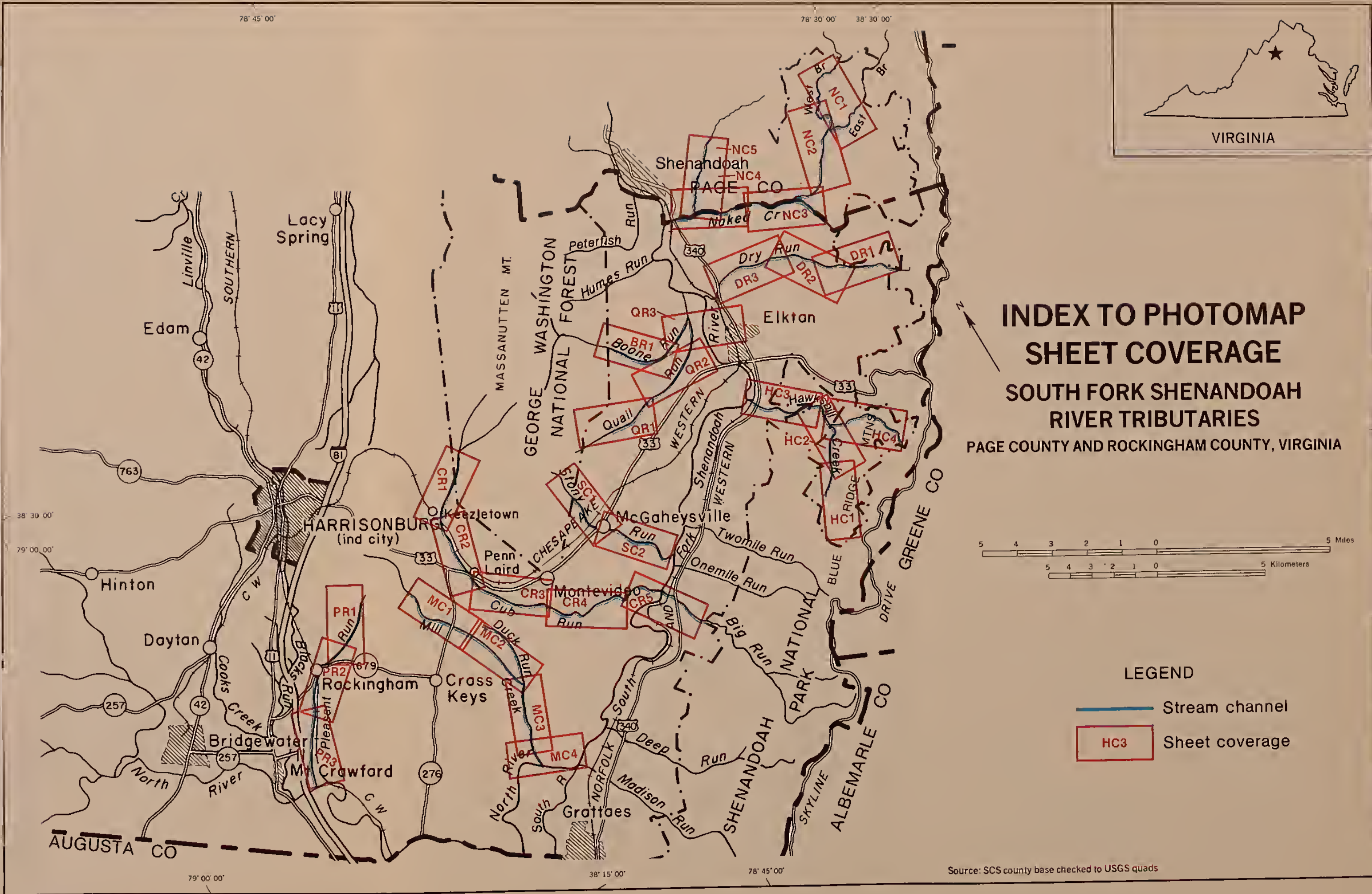
The photomaps, flood profiles and bench mark data can be used to locate flood elevations between surveyed cross sections, as follows:

1. On the appropriate photomap find the point on the stream where the flood line is to be located; then scale the distance along the stream to the nearest cross section.
2. On the appropriate flood profile sheet, scale the distance determined in Step 1 from the cross section back to the original stream location, and read the elevation of the desired flood frequency line.
3. Transfer the elevation determined in Step 2 to the ground from the nearest established benchmark.

A glossary, bibliography and discussion of technical procedures are included in the main report for this study. The basic data is on file in the office of the USDA Soil Conservation Service, Richmond, Virginia 23240.











LEGEND

→ Stream channel

500 year flood area

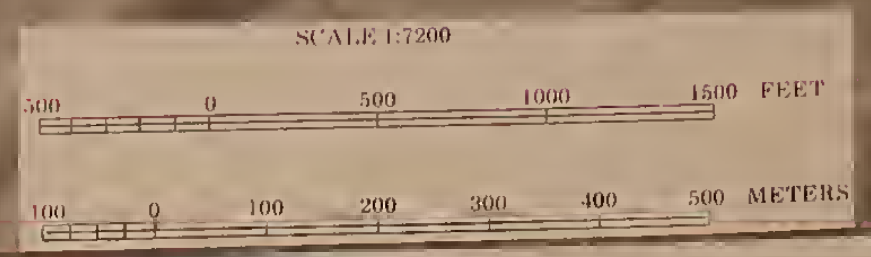
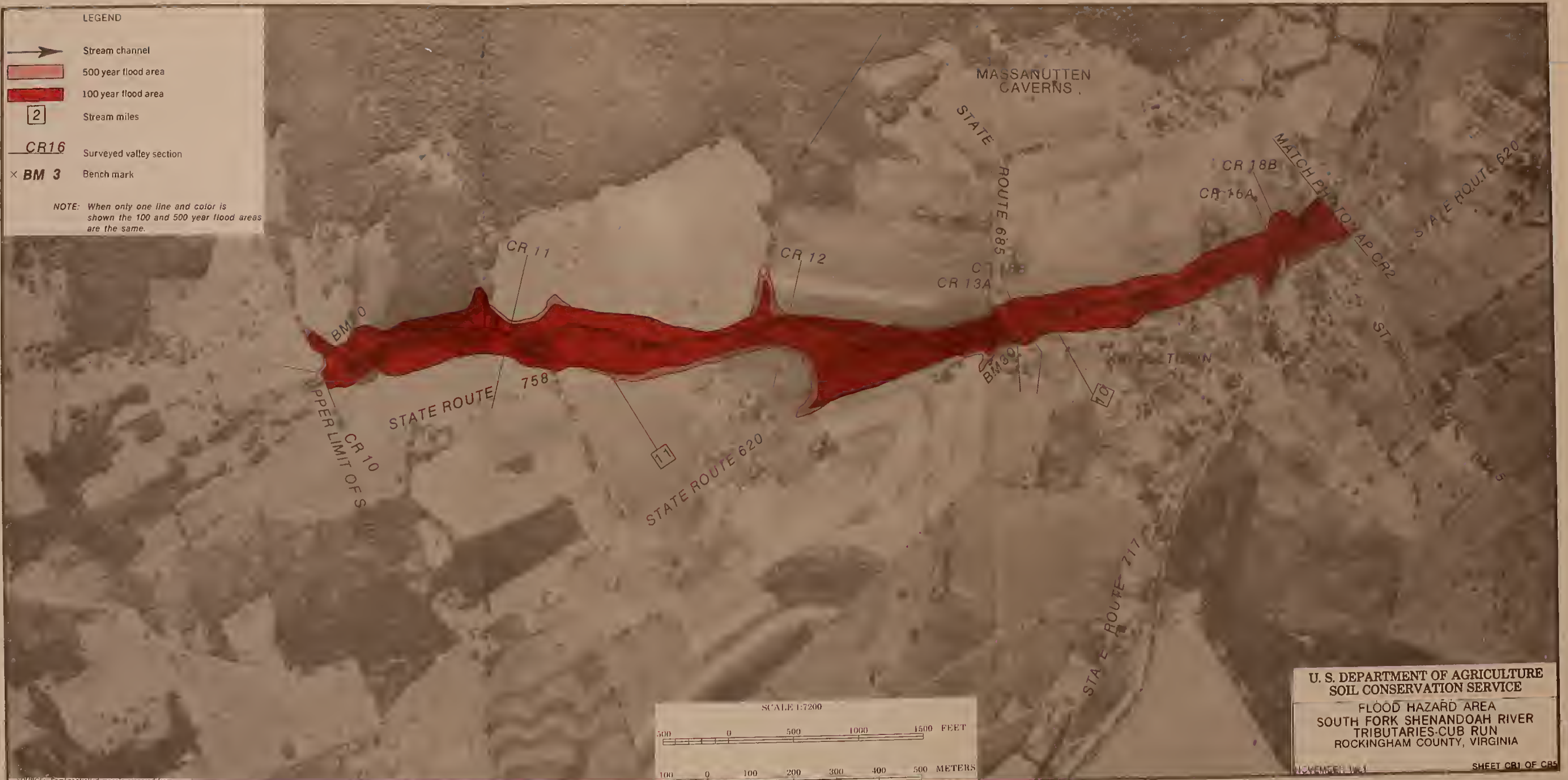
100 year flood area

2 Stream miles

CR16 Surveyed valley section

× BM 3 Bench mark

NOTE: When only one line and color is shown the 100 and 500 year flood areas are the same.



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FLOOD HAZARD AREA  
SOUTH FORK SHENANDOAH RIVER  
TRIBUTARIES-CUB RUN  
ROCKINGHAM COUNTY, VIRGINIA

NOVEMBER 1974

SHEET CR1 OF CR5



LEGEND

→ Stream channel

500 year flood area

100 year flood area

2 Stream miles

CR16 Surveyed valley section

× BM 3 Bench mark

NOTE: When only one line and color is shown the 100 and 500 year flood areas are the same.



SOURCE: Semi-controlled mosaic prepared from USDA-ASCS Aerial photography flown 1974

USDA-SCS-FORT WORTH, TEXAS 1983

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FLOOD HAZARD AREA  
SOUTH FORK SHENANDOAH RIVER  
TRIBUTARIES-CUB RUN  
ROCKINGHAM COUNTY, VIRGINIA

NOVEMBER 1981

SHEET CR2 OF CR5





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FLOOD HAZARD AREA  
SOUTH FORK SHENANDOAH RIVER  
TRIBUTARIES-CUB RUN  
ROCKINGHAM COUNTY, VIRGINIA

NOVEMBER 1981

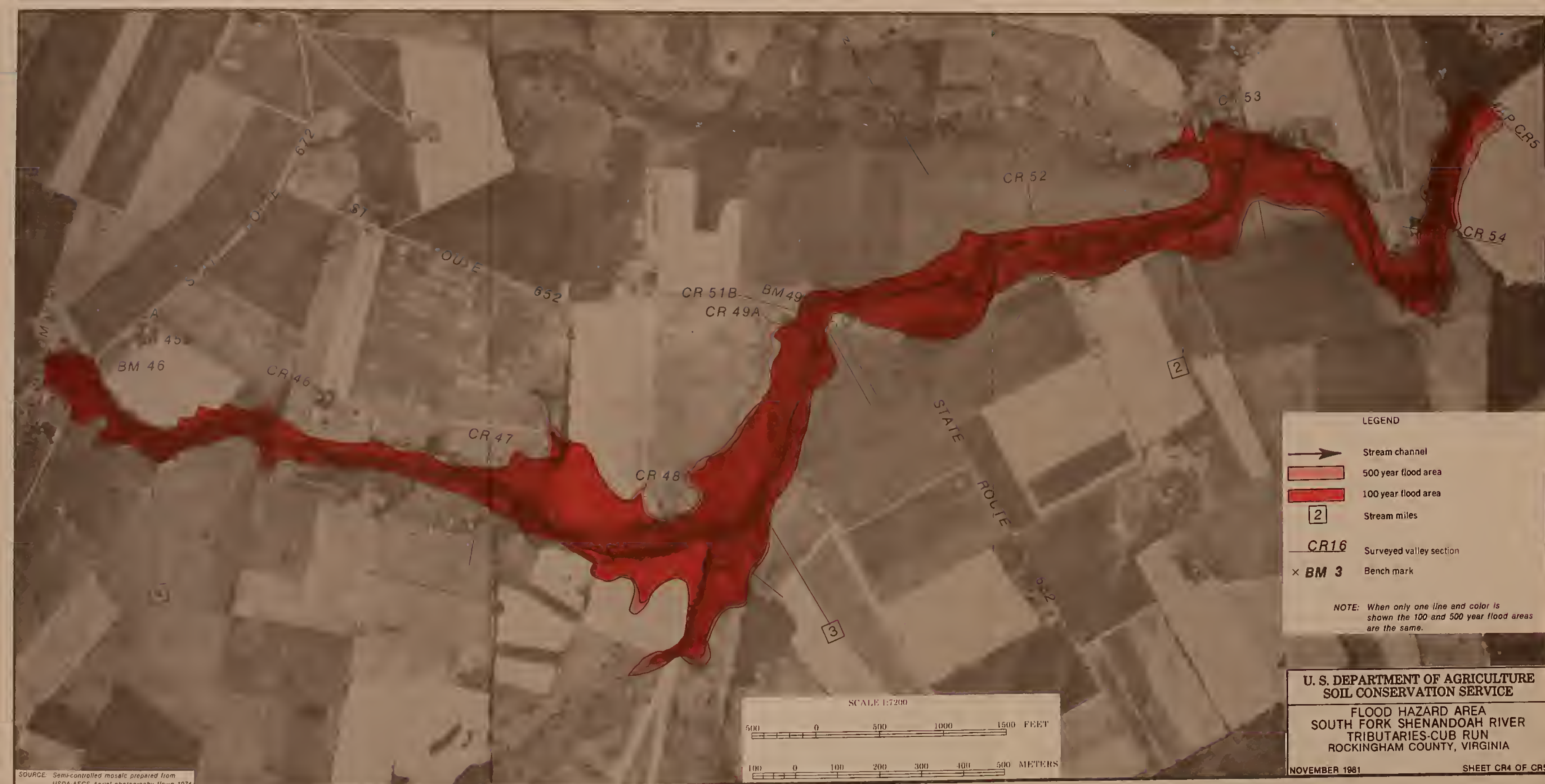
SHEET CR3 OF CR5



SOURCE: Semi-controlled mosaic prepared from  
USDA-ASCS Aerial photography flown 1974

USDA-SCS-FORT WORTH, TEXAS 1983





LEGEND

→ Stream channel

500 year flood area

100 year flood area

2 Stream miles

CR16 Surveyed valley section

x BM 3 Bench mark

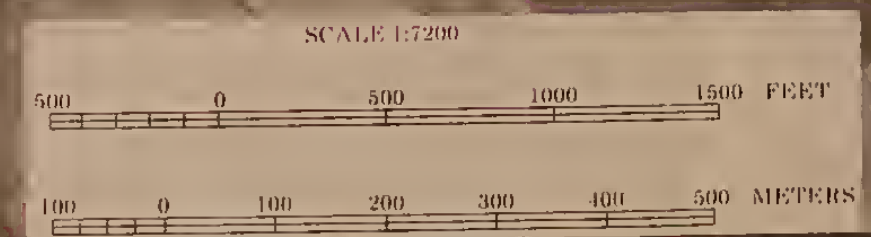
NOTE: When only one line and color is shown the 100 and 500 year flood areas are the same.

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FLOOD HAZARD AREA  
SOUTH FORK SHENANDOAH RIVER  
TRIBUTARIES-CUB RUN  
ROCKINGHAM COUNTY, VIRGINIA

NOVEMBER 1981

SHEET CR4 OF CR5



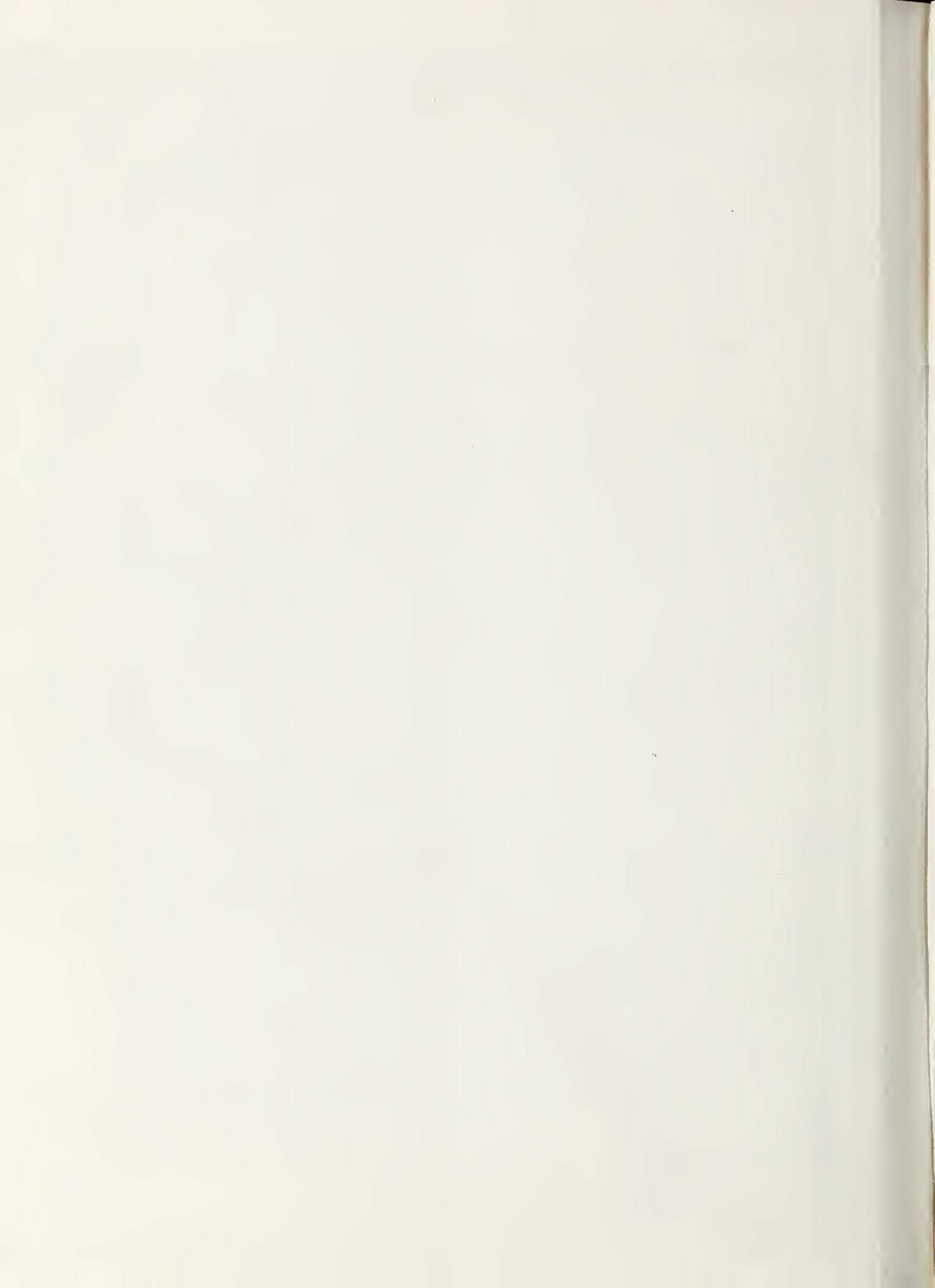
SOURCE: Semi-controlled mosaic prepared from  
USDA-ASCS Aerial photography flown 1974

USDA-SCS-FORT WORTH, TEXAS 1983











ELEVATION (FEET NGVD)

ELEVATION (FEET NGVD)

1410  
1400  
1390  
1380  
1370  
1360  
1350  
1340

1380  
1390  
1370  
1360  
1350  
1340

595+00 590+00 585+00 580+00 575+00 570+00 565+00 560+00 555+00 550+00

CUB RUN  
FEET UPSTREAM FROM MOUTH

UPPER LIMIT OF STUDY

CR10

CR11

CR12

50 YR  
NOT SHOWN

LEGEND

500 YR	—————	SURVEYED X-SECTION	CR20
100 YR	—————	ELEV-BRIDGE DECK	I
50 YR	—————	ELEV-LOW BEAM	I
10 YR	.....	ELEV-LOW ROAD	—
LOW BANK	—————	STATE ROUTE 600	SR 600
CHANNEL BOTTOM	—————	US HIGHWAY 99	US 99
		STREAM MILES	2

FLOOD PROFILES

S FK SHENANDOAH RIVER TRIBS  
ROCKINGHAM COUNTY, VIRGINIA

U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

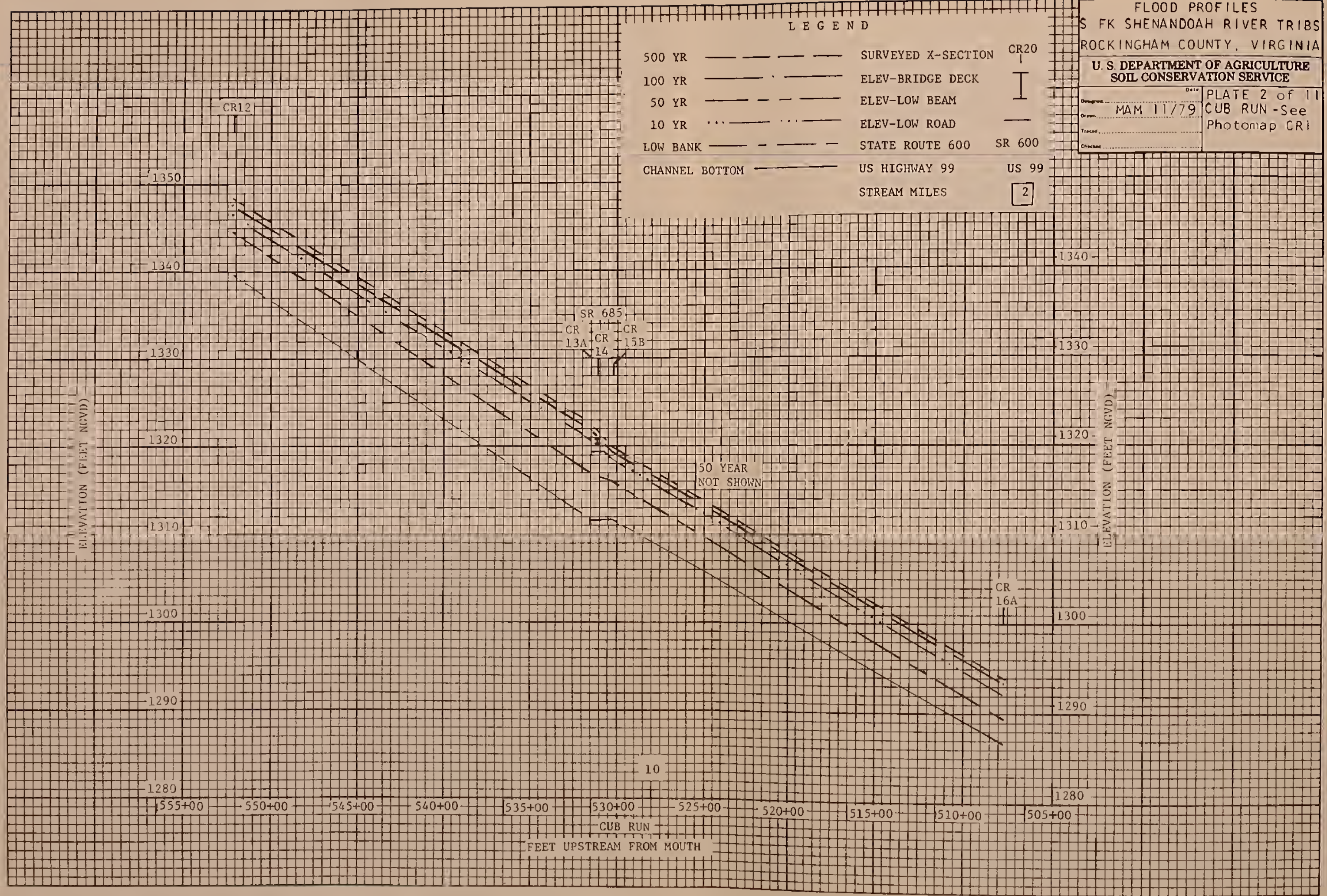
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Drawn: MAM 11/79  
Traced: MAM 11/79  
Checked: MAM 11/79

PLATE 1 of 11  
CUB RUN-See  
Photomap CR1



LEGEND

500 YR	—————	SURVEYED X-SECTION	CR20
100 YR	—————	ELEV-BRIDGE DECK	I
50 YR	—————	ELEV-LOW BEAM	—
10 YR	·····	ELEV-LOW ROAD	—
LOW BANK	—————	STATE ROUTE 600	SR 600
CHANNEL BOTTOM	—————	US HIGHWAY 99	US 99
		STREAM MILES	2

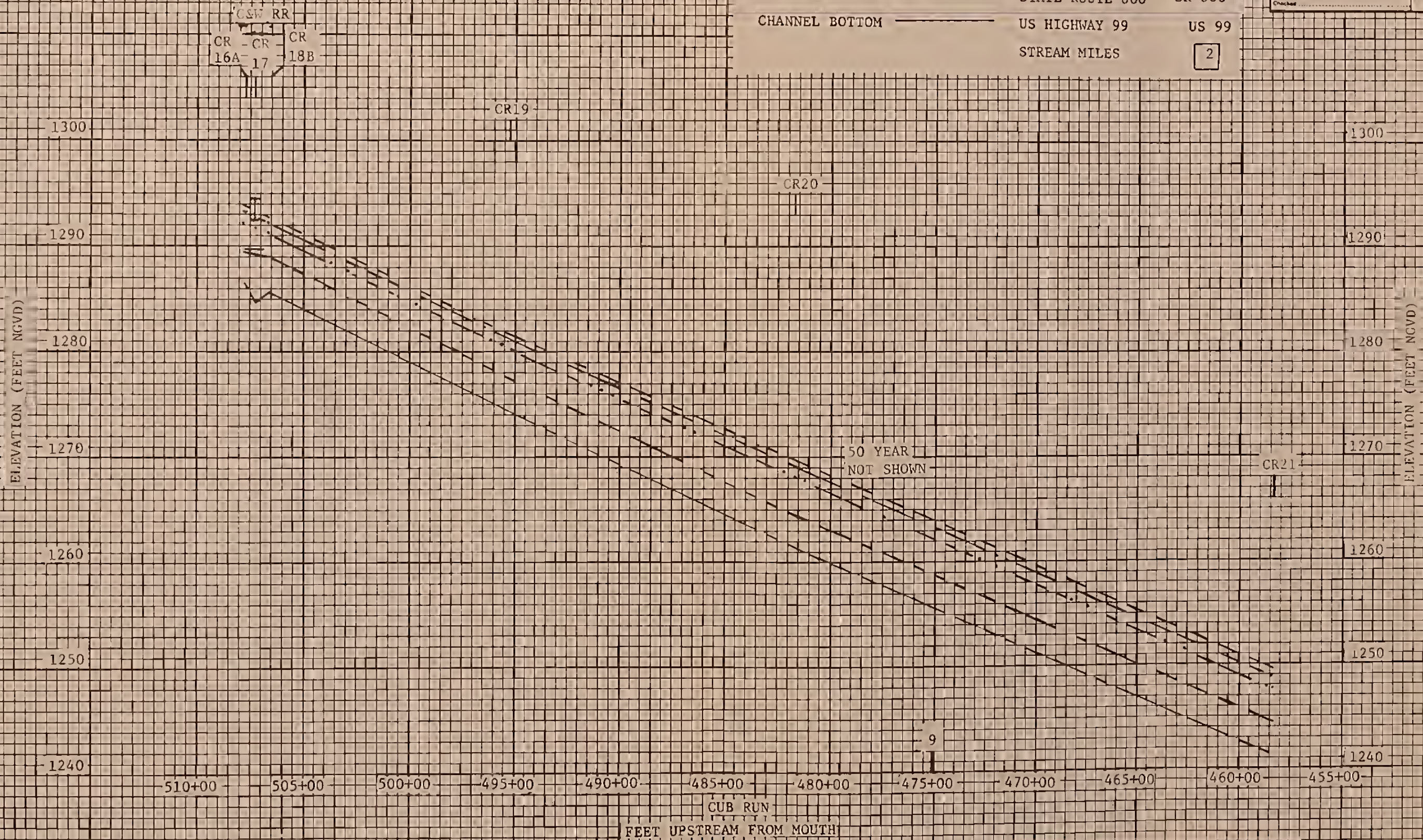




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500 YR	—————	SURVEYED X-SECTION	CR20
100 YR	—————	ELEV-BRIDGE DECK	
50 YR	—————	ELEV-LOW BEAM	
10 YR	·····	ELEV-LOW ROAD	
LOW BANK	—————	STATE ROUTE 600	SR 600
CHANNEL BOTTOM	—————	US HIGHWAY 99	US 99
		STREAM MILES	2

FLOOD PROFILES	
S FK SHENANDDAH RIVER TRIBS	
ROCKINGHAM COUNTY, VIRGINIA	
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	
Designed: MAM 11779	DATE: PLATE 3 of 11
Drawn:	CUB RUN - See
Traced:	Photomaps
Checked:	CR1 & CR2





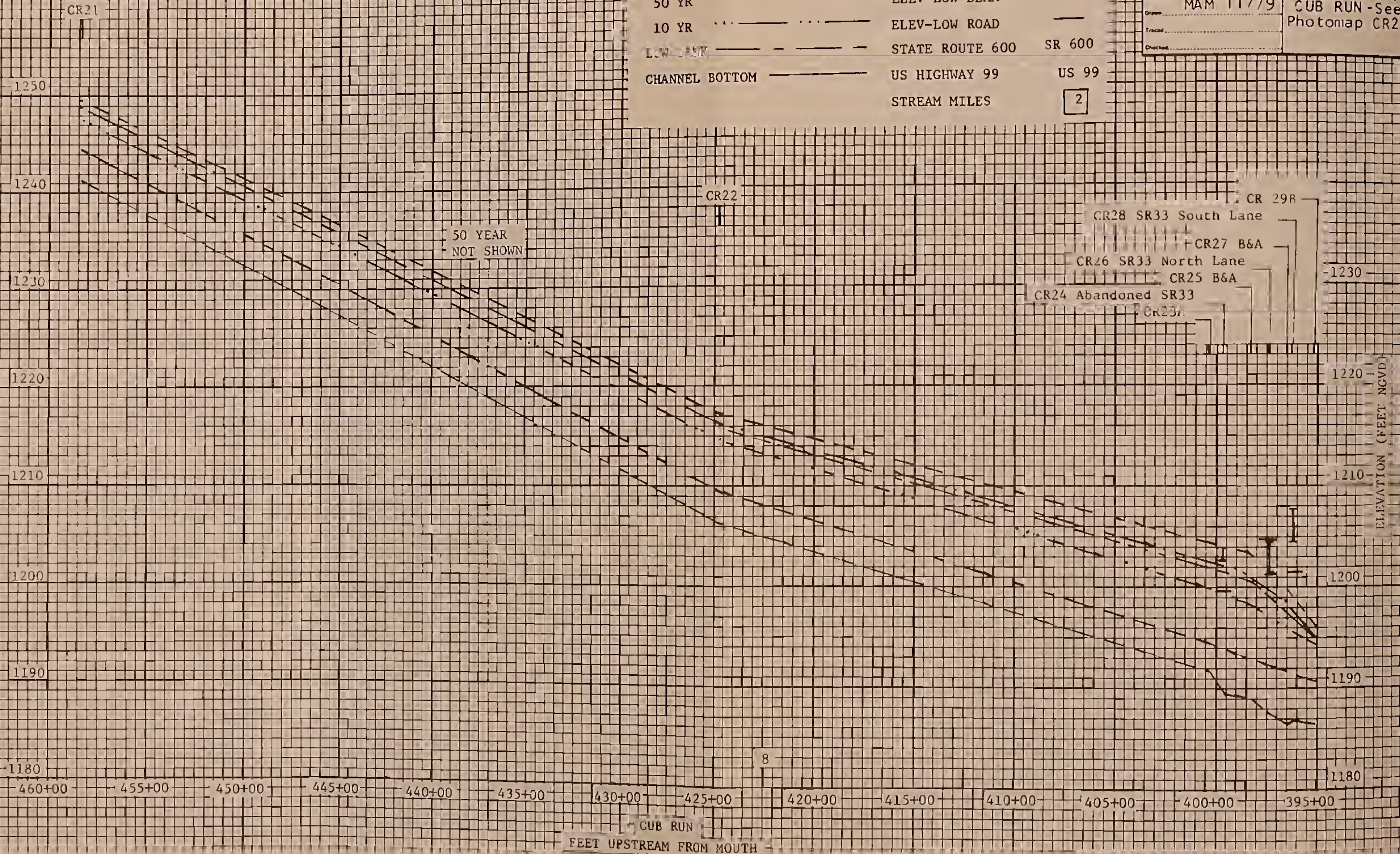
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100 YR	—————	ELEV-BRIDGE DECK	
50 YR	—————	ELEV-LOW BEAM	
10 YR	·····	ELEV-LOW ROAD	
LOW BEAM	—————	STATE ROUTE 600	SR 600
CHANNEL BOTTOM	—————	US HIGHWAY 99	US 99
		STREAM MILES	2

FLOOD PROFILES  
S FK SHENANDOAH RIVER TRIBS  
ROCKINGHAM COUNTY, VIRGINIA  
U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

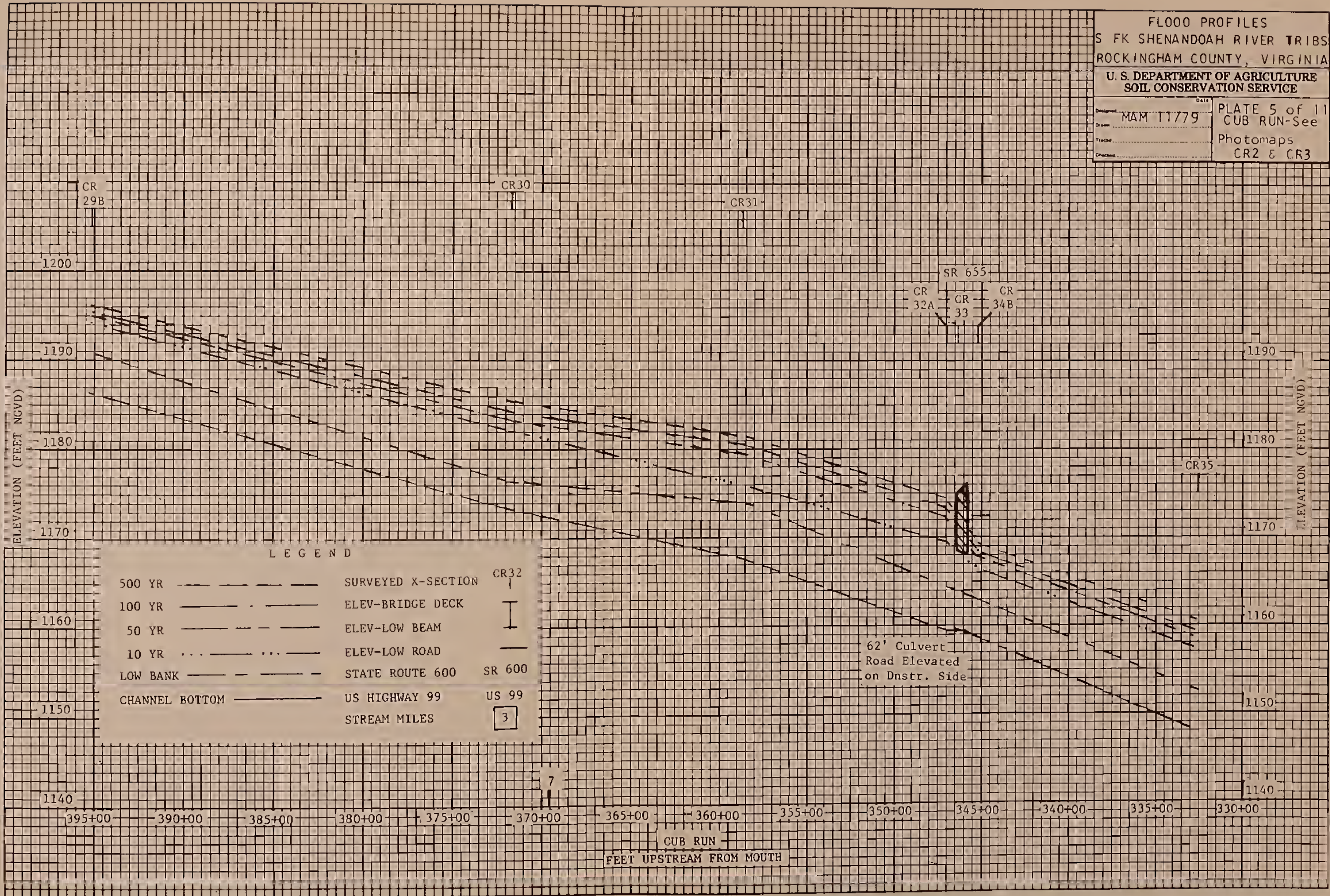
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PLATE 4 of 11  
CUB RUN - See  
Photomap CR2





FLOOD PROFILES	
S FK SHENANDOAH RIVER TRIBS	
ROCKINGHAM COUNTY, VIRGINIA	
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	
Designed: MAM 11779	Date: PLATE 5 of 11
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Traced: _____	Photomaps
Checked: _____	CR2 & CR3

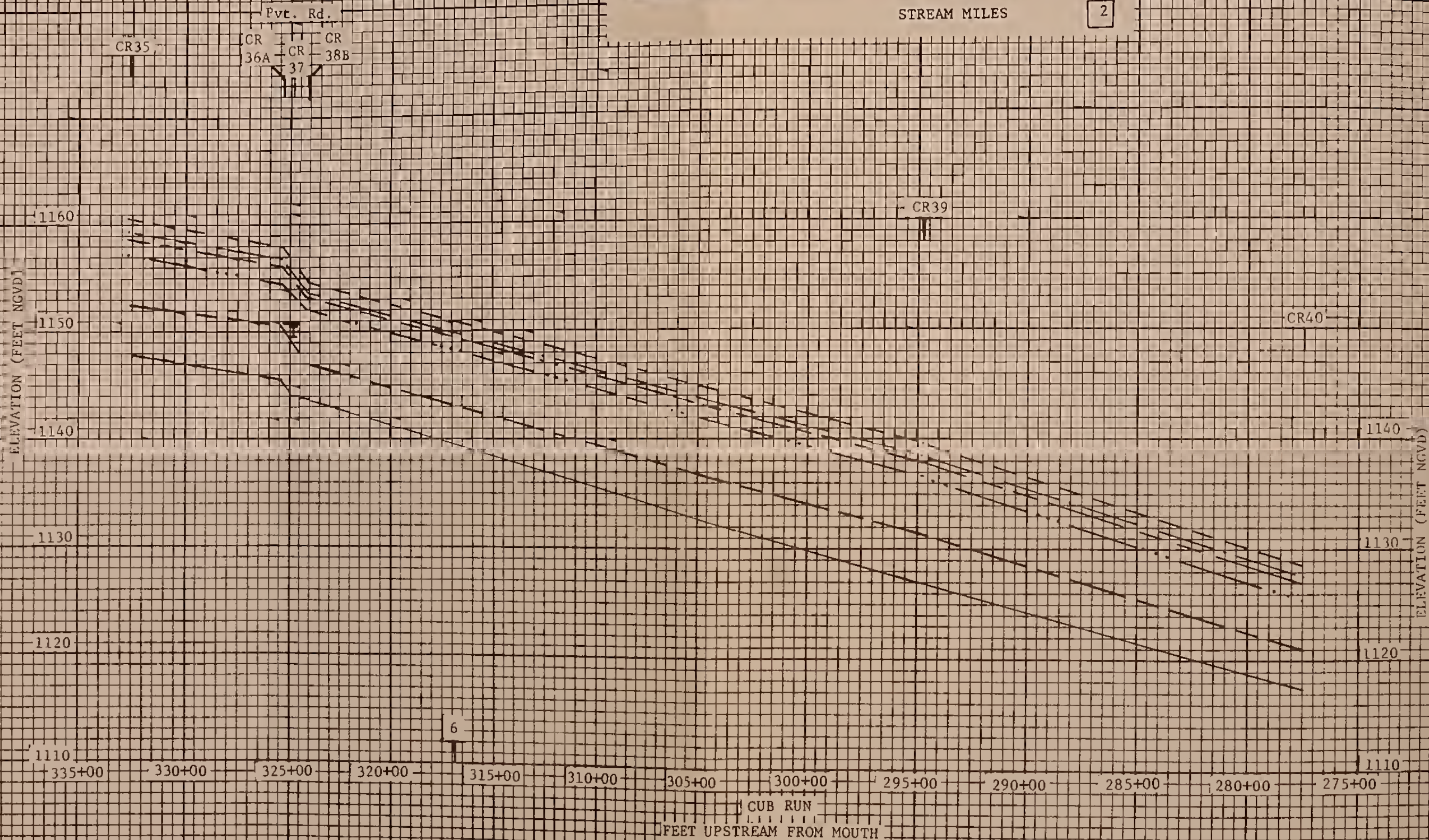




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50 YR	-----	ELEV-LOW BEAM	---
10 YR	-----	ELEV-LOW ROAD	---
LOW BANK	-----	STATE ROUTE 600	SR 600
CHANNEL BOTTOM	-----	US HIGHWAY 99	US 99
		STREAM MILES	2

FLOOD PROFILES	
S FK SHENANDOAH RIVER TRIBS ROCKINGHAM COUNTY, VIRGINIA	
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	
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Drawn	PLATE 6 of 11
Traced	CUB RUN-See
Checked	Photomap CR3

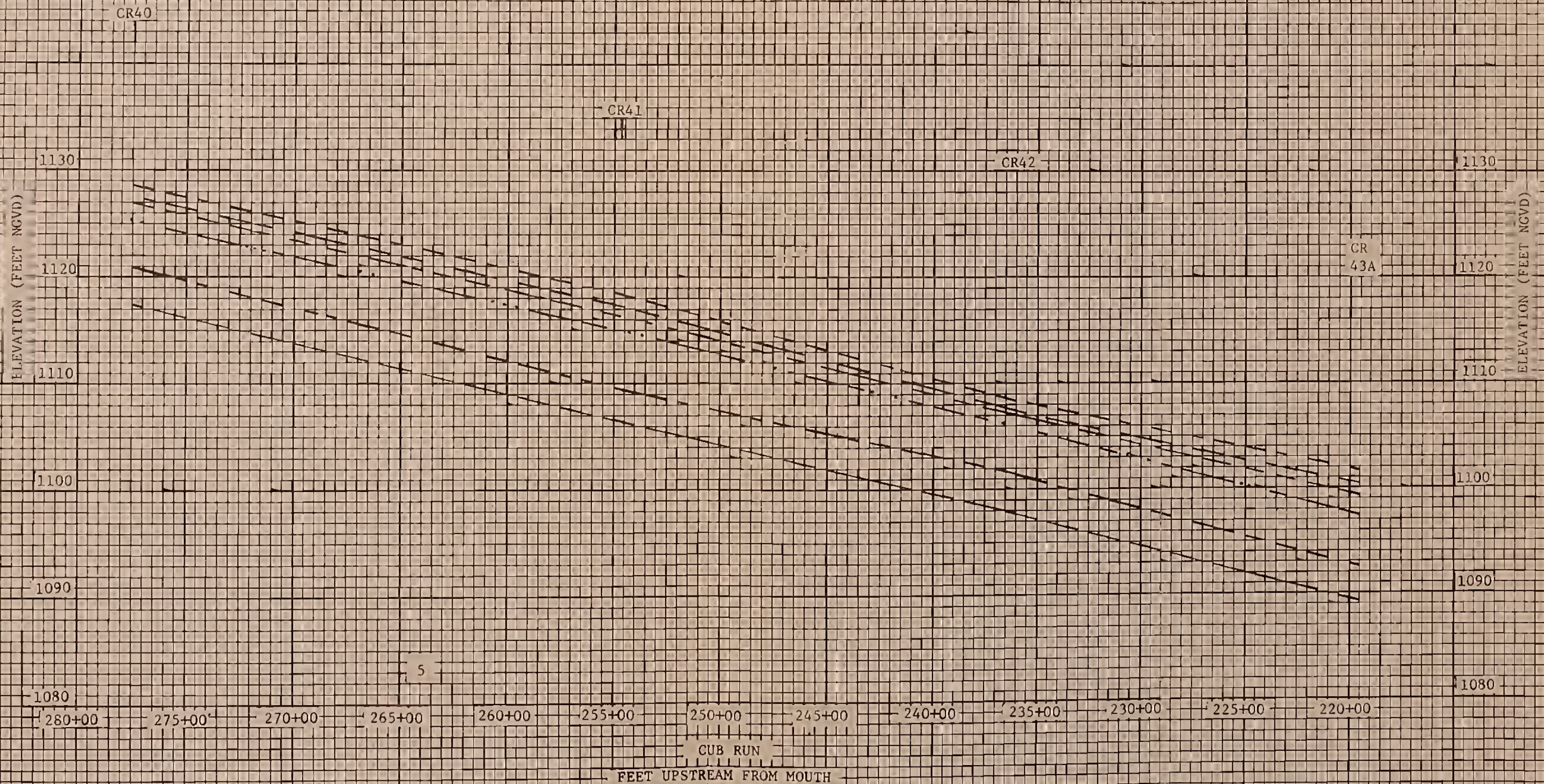




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50 YR	—————	ELEV-LOW BEAM	
10 YR	.....	ELEV-LOW ROAD	
LOW BANK	—————	STATE ROUTE 600	SR 600
CHANNEL BOTTOM	—————	US HIGHWAY 99	US 99
		STREAM MILES	3

FLOOD PROFILES	
S FK SHENANDOAH RIVER TRIBS	
ROCKINGHAM COUNTY, VIRGINIA	
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	
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Traced	CUB RUN-See
Checked	Photomaps
	CR3 & CR4





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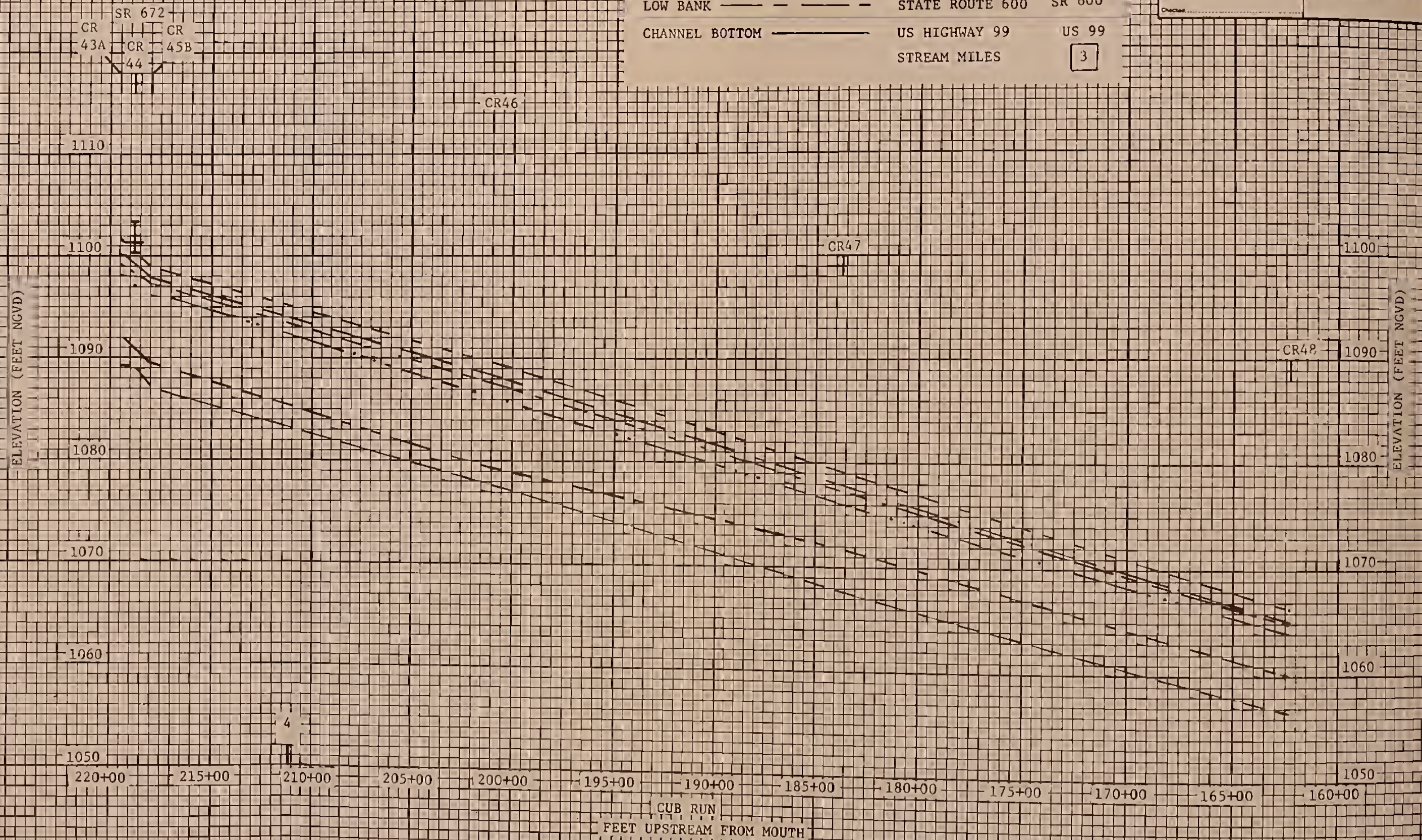
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50 YR	-----	ELEV-LOW BEAM	
10 YR	....	ELEV-LOW ROAD	
LOW BANK	-----	STATE ROUTE 600	SR 600
CHANNEL BOTTOM	-----	US HIGHWAY 99	US 99
		STREAM MILES	3

FLOOD PROFILES  
S FK SHENANDOAH RIVER TRIBS  
ROCKINGHAM COUNTY, VIRGINIA

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SOIL CONSERVATION SERVICE

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PLATE 8 of 11  
CUB RUN - See  
Photomap CR4





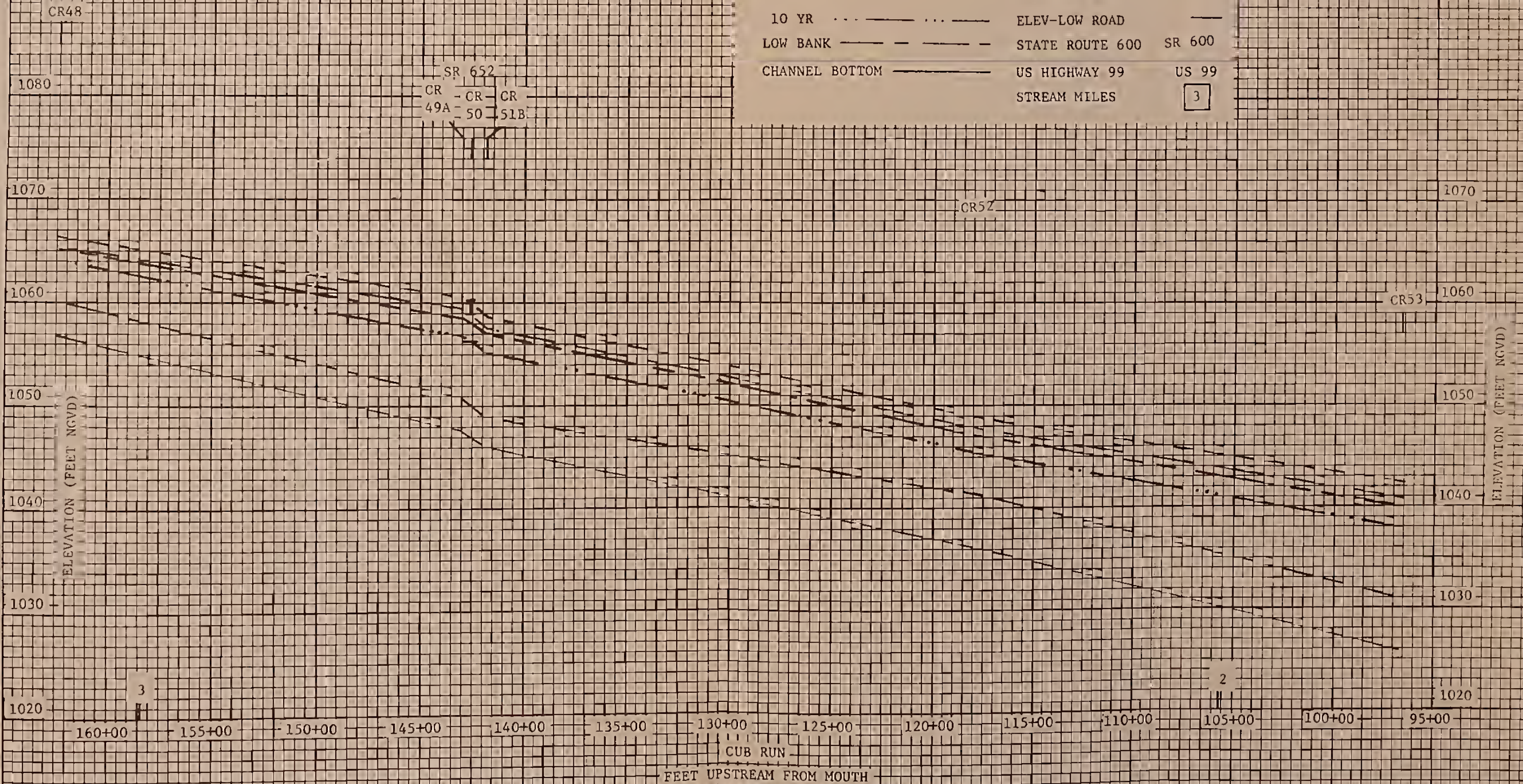
FLOOD PROFILES  
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ROCKINGHAM COUNTY, VIRGINIA

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Date: 11/79  
Designed: MAM  
Drawn: CUB RUN - See  
Traced: Photomap CR4  
Checked:

LEGEND

500 YR	-----	SURVEYED X-SECTION	CR32
100 YR	-----	ELEV-BRIDGE DECK	I
50 YR	-----	ELEV-LOW BEAM	I
10 YR	-----	ELEV-LOW ROAD	---
LOW BANK	-----	STATE ROUTE 600	SR 600
CHANNEL BOTTOM	-----	US HIGHWAY 99	US 99
		STREAM MILES	3





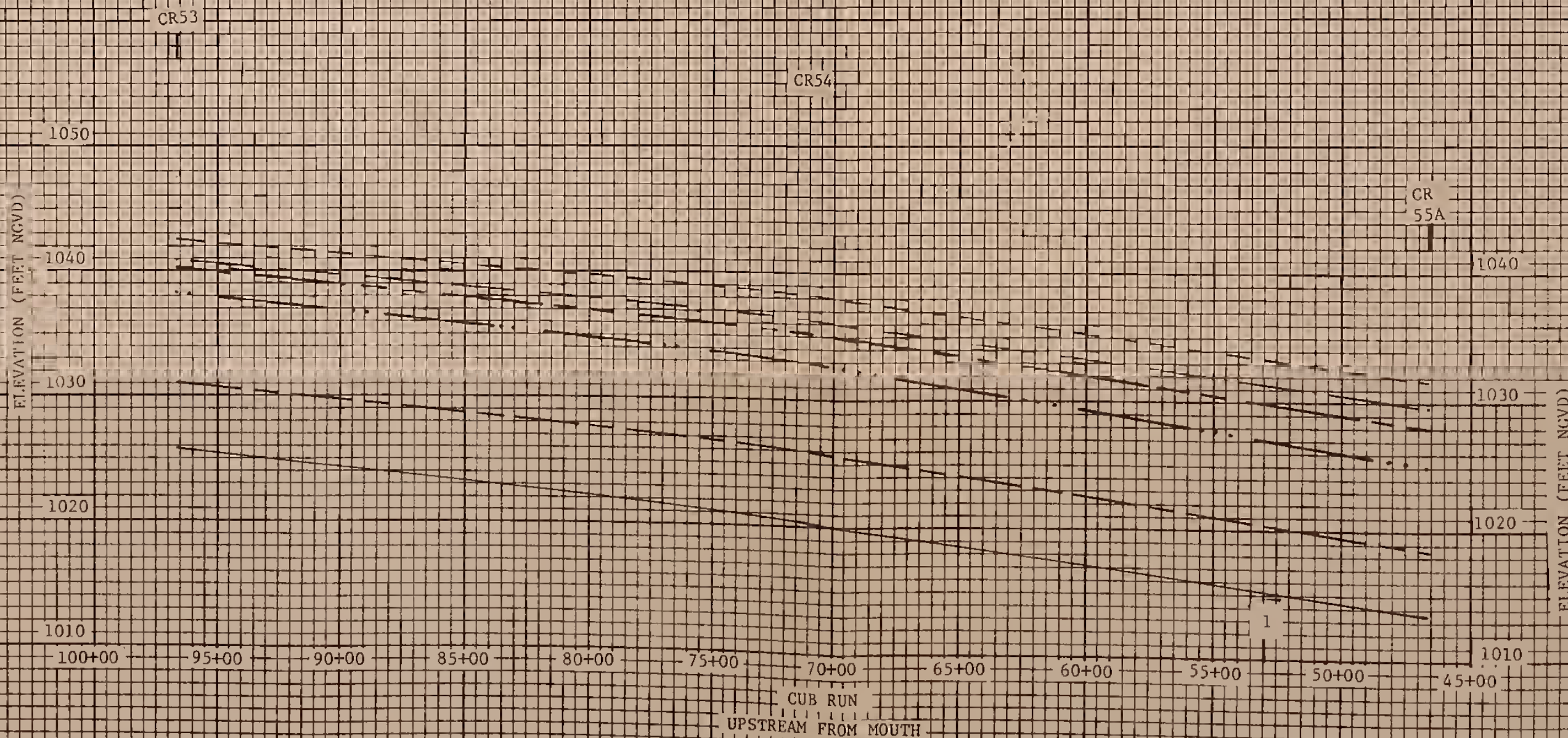
FLOOD PROFILES  
S FK SHENANDOAH RIVER TRIBS  
ROCKINGHAM COUNTY, VIRGINIA

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Designed: MAM 11/79  
Drawn: MAM 11/79  
Traced: MAM 11/79  
Checked: MAM 11/79  
Date: 11/79  
PLATE 10 of 11  
CUB RUN - See  
Photomaps  
CR4 & CR5

LEGEND

500 YR	-----	SURVEYED X-SECTION	CR32
100 YR	-----	ELEV-BRIDGE DECK	I
50 YR	-----	ELEV-LOW BEAM	I
10 YR	....	ELEV-LOW ROAD	---
LOW BANK	-----	STATE ROUTE 600	SR 600
CHANNEL BOTTOM	-----	US HIGHWAY 99	US 99
		STREAM MILES	3





# LEGEND

500 YR	-----	SURVEYED X-SECTION	CR32
100 YR	-----	ELEV-BRIDGE DECK	I
50 YR	-----	ELEV-LOW BEAM	I
10 YR	....	ELEV-LOW ROAD	---
LOW BANK	-----	STATE ROUTE 600	SR 600
CHANNEL BOTTOM	-----	US HIGHWAY 99	US 99
		STREAM MILES	3

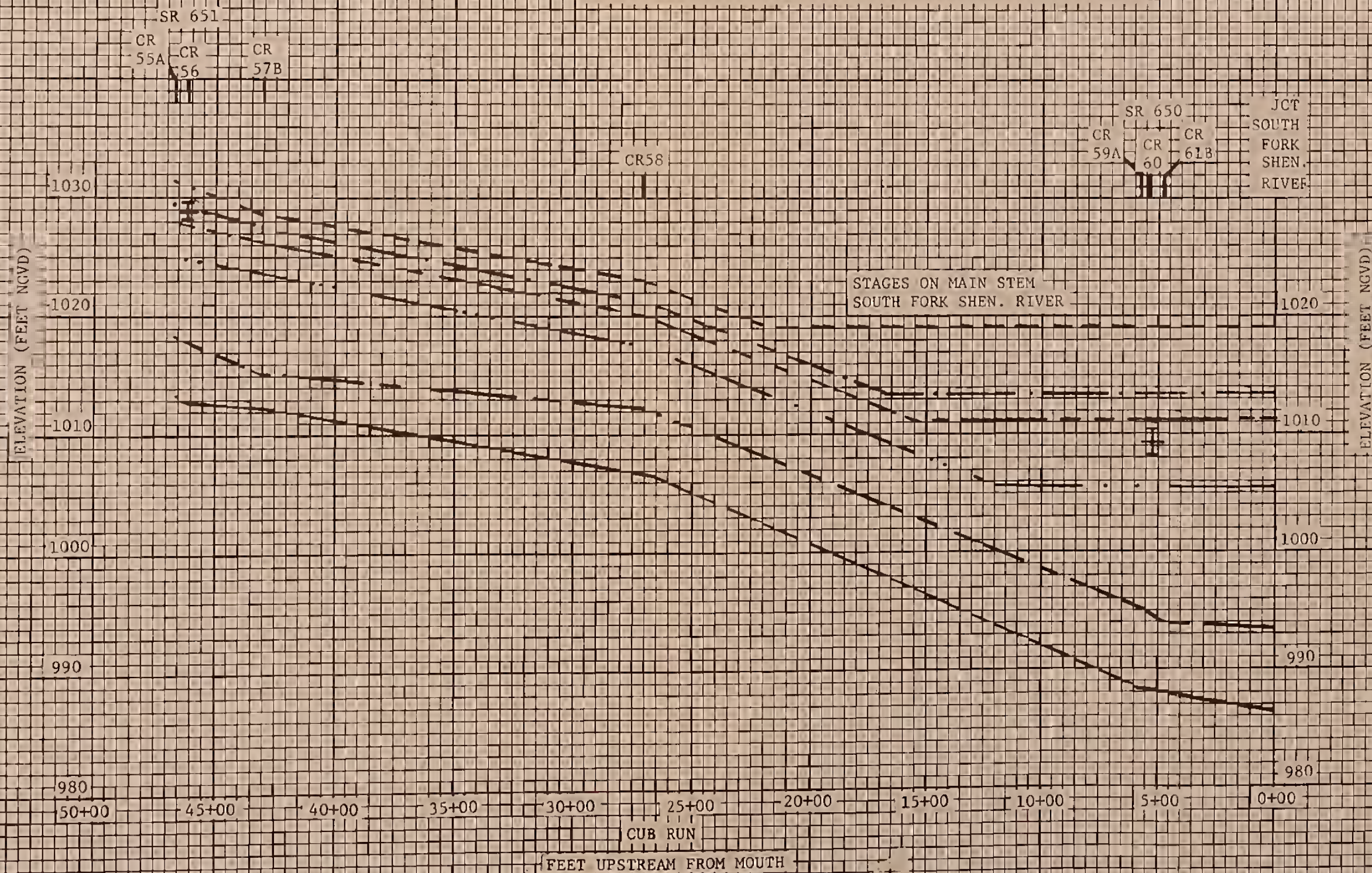
## FLOOD PROFILES

S FK SHENANDOAH RIVER TRIBS  
ROCKINGHAM COUNTY, VIRGINIA

U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

Original: MAM 11/79  
Drawn: MAM 11/79  
Flooded: MAM 11/79  
Checked: MAM 11/79

PLATE 11 of 11  
CUB RUN-See  
Photomap CR5





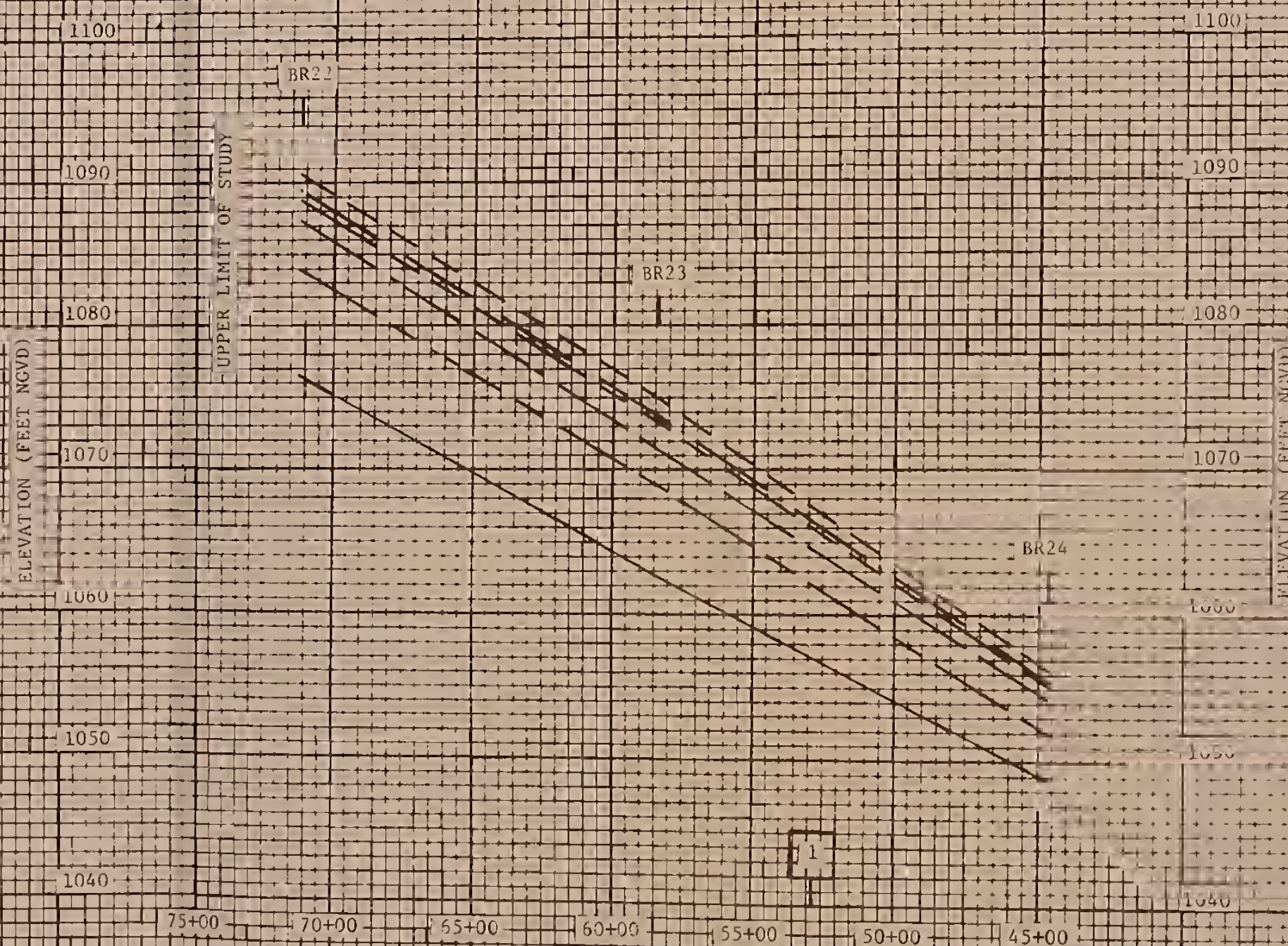
# FLOOD PROFILES S FK SHENANDOAH RIVER TRIBS ROCKINGHAM COUNTY, VIRGINIA

U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

PLATE 1 of 2  
BIG RUN-See  
Photomap CR5

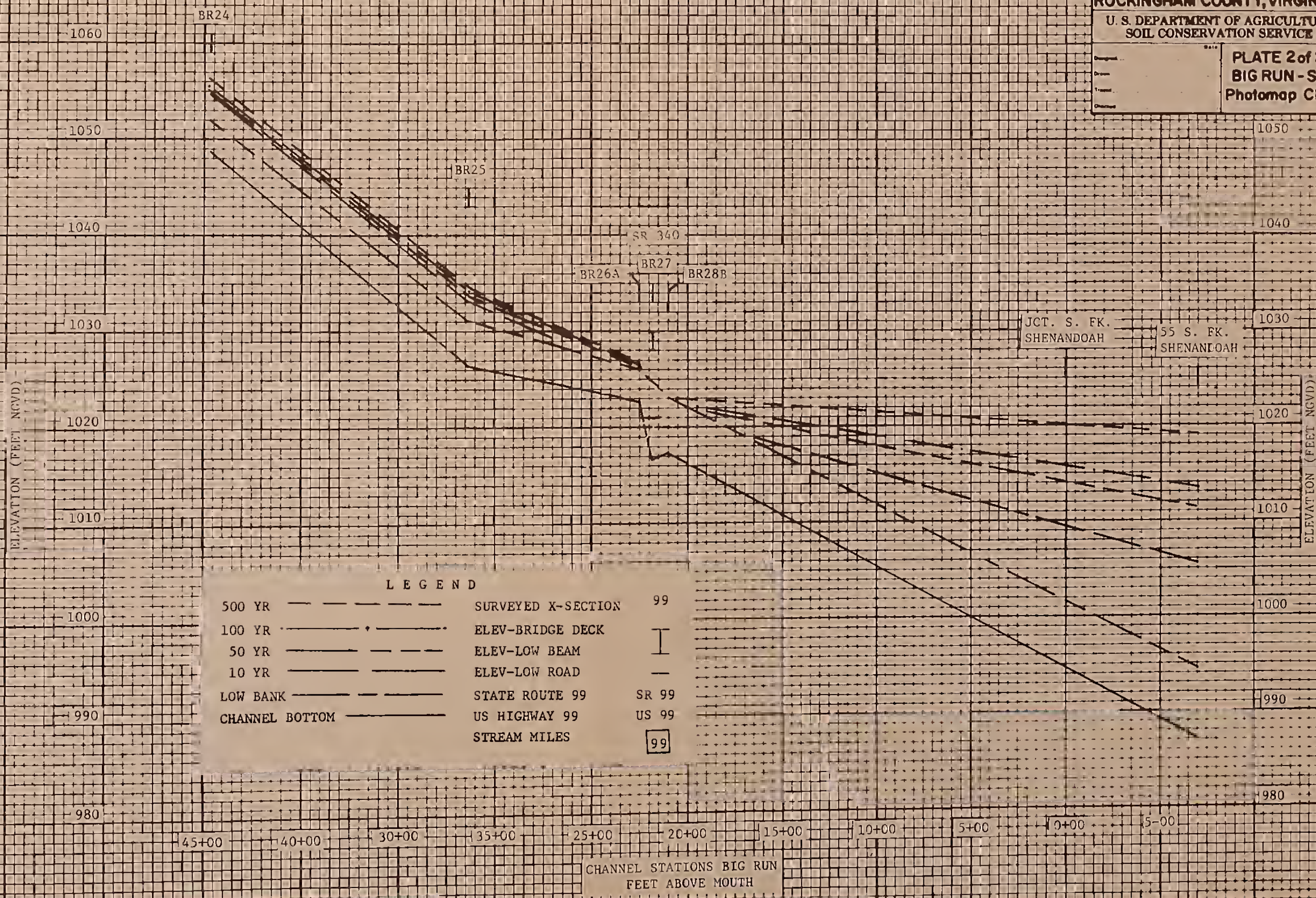
## LEGEND

500 YR	-----	SURVEYED X-SECTION	99
100 YR	-----	ELEV-BRIDGE DECK	I
50 YR	-----	ELEV-LOW BEAM	I
10 YR	-----	ELEV-LOW ROAD	---
LOW BANK	-----	STATE ROUTE 99	SR 99
CHANNEL BOTTOM	-----	US HIGHWAY 99	US 99
		STREAM MILES	99



CHANNEL STATIONS BIG RUN -  
FEET ABOVE MOUTH





LEGEND			
500 YR	— — — — —	SURVEYED X-SECTION	99
100 YR	— — — — —	ELEV-BRIDGE DECK	I
50 YR	— — — — —	ELEV-LOW BEAM	I
10 YR	— — — — —	ELEV-LOW ROAD	—
LOW BANK	— — — — —	STATE ROUTE 99	SR 99
CHANNEL BOTTOM	— — — — —	US HIGHWAY 99	US 99
		STREAM MILES	99







TYPICAL CROSS SECTIONS  
SOUTH FORK SHEN. RIVER  
TRIBUTARIES - CUB RUN  
ROCKINGHAM COUNTY, VIRGINIA

U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

Date  
Designed.....  
Drawn..... MAM 2/79  
Traced.....  
Checked.....

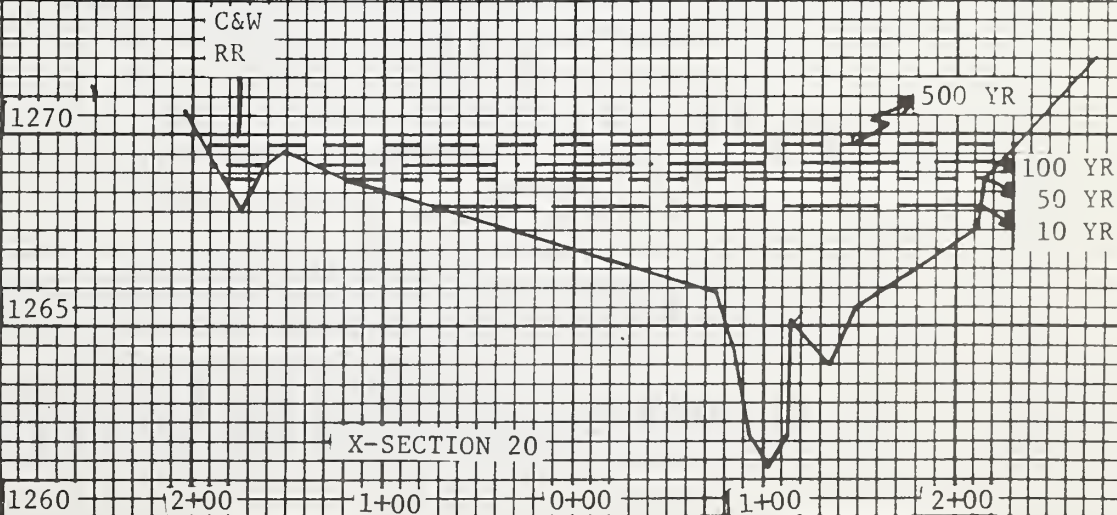
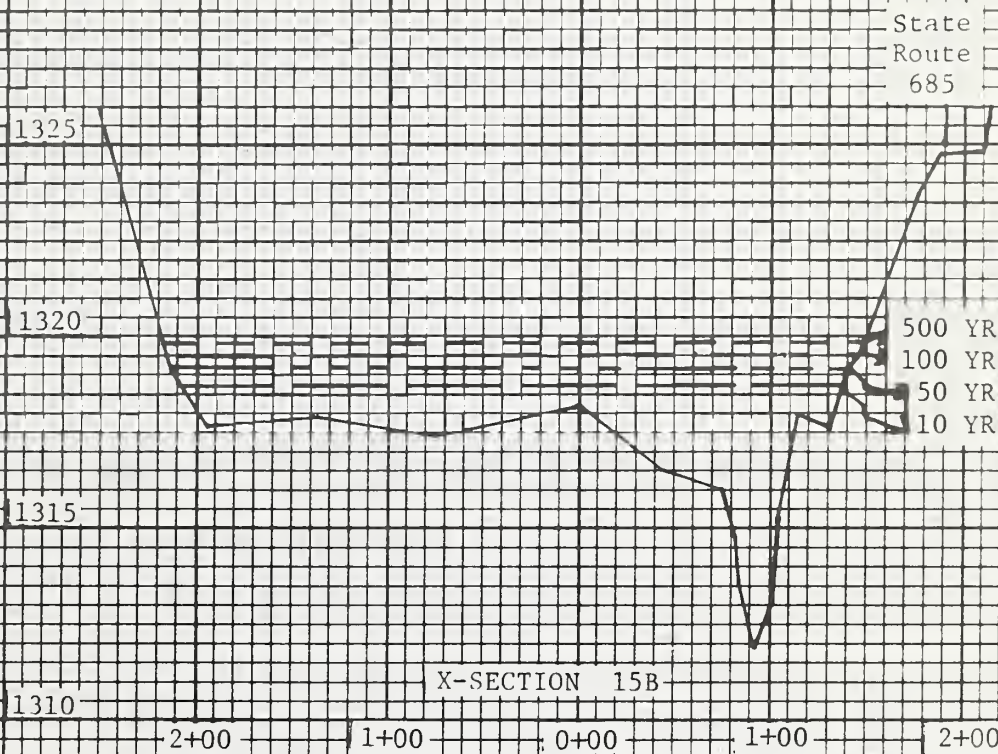


Table CR-1 Frequency-discharge-elevations, Cub Run  
South Fork Shenandoah River Tributaries, Rockingham County, Virginia

X-Sec.	Photomap No.	Profile Plate No.	DA (sq mi.)	10-year		25-year		50-year		100-year		500-year	
				Disch. (cfs)	Elev. (ngvd)	Disch. (cfs)	Elev. (ngvd)	Disch. (cfs)	Elev. (ngvd)	Disch. (cfs)	Elev. (ngvd)	Disch. (cfs)	Elev. (ngvd)
Cub Run - Upper limit of study area													
CR10	CR1	1	3.2	1090	1403.6	1490	1404.0	1620	1404.1	1900	1404.6	2500	1405.0
CR11	CR1	1	4.9	1500	1380.0	1850	1380.5	2200	1380.9	2600	1381.1	3400	1381.6
CR12	CR1	1 & 2	5.6	1630	1346.5	1980	1346.9	2400	1347.2	2810	1347.8	3700	1348.2
CR13A	CR1	2	7.3	1960	1320.9	2190	1321.1	2900	1321.8	3400	1322.0	4450	1322.5
CR14	CR1	2	State Route 685 - Low road - 1319.2 - Bridge deck - 1320.8 - Low steel - 1320.2										
CR15B	CR1	2	7.3	1970	1318.7	2200	1318.9	2910	1319.3	3410	1319.5	4460	1319.9
CR16A	CR1	2 & 3	8.8	2190	1292.2	2710	1292.6	3200	1292.9	3890	1293.4	5020	1294.0
CR17	CR1	3	C&W RR - Low road - 1289.7 - Bridge deck - 1294.4 - Low steel - 1292.5										
CR18B	CR1	3	8.8	2200	1291.3	2720	1291.7	3210	1292.0	3900	1292.4	5030	1292.9
CR19	CR2	3	9.0	2220	1280.1	2780	1280.5	3340	1280.9	3940	1281.2	5100	1281.8
CR20	CR2	3	9.9	2390	1268.1	3000	1268.5	3600	1268.9	4210	1269.3	5510	1269.8
CR21	CR2	3 & 4	10.6	2450	1247.7	3100	1248.3	3790	1248.7	4400	1249.0	5800	1249.6
CR22	CR2	4	13.4	2900	1214.7	3720	1215.5	4400	1216.0	5200	1216.5	6800	1217.3
CR23A	CR2	4	14.0	2980	1199.9	3860	1201.3	4600	1202.0	5400	1202.8	7060	1204.4
CR24	CR2	4	(Old) State Rte. 33 - Low road - 1199.7 - Bridge deck - 1203.9 - Low steel - 1202.8										
CR25BA	CR2	4	14.1	2990	1198.2	3870	1199.5	4610	1200.5	5410	1201.5	7070	1203.6
CR26	CR2	4	N-bound State Rte. 33 - Low road - 1204.5 - Bridge deck - 1204.5 - Low steel - 1201.1										
CR27BA	CR2	4	14.1	3000	1195.9	3880	1196.7	4620	1197.6	5420	1198.6	7080	1200.5
CR28	CR2	4	S-bound State Rte. 33 - Low road - 1201.3 - Bridge deck - 1207.6 - Low steel - 1204.4										
CR29B	CR2	4 & 5	14.1	3010	1194.4	3890	1194.9	4630	1195.2	5430	1195.5	7100	1196.1
CR30	CR2	5	14.6	3050	1182.2	3900	1182.9	4700	1183.6	5480	1184.2	7180	1185.3
CR31	CR3	5	14.7	3060	1176.0	3910	1179.0	4720	1179.6	5500	1180.3	7200	1181.5
CR32A	CR3	5	15.4	3150	1169.6	4100	1171.1	4900	1172.3	5800	1173.4	7540	1174.5
CR33	CR3	5	State Route 655 - Low road - 1172.2 - Top culvert - 1169.2 - Road over culvert - 1174.8										
CR34B	CR3	5	16.4	3310	1166.7	4280	1167.4	5150	1167.9	5950	1168.3	7750	1169.3
CR35	CR3	5 & 6	16.5	3320	1157.3	4300	1158.1	5200	1158.8	6000	1159.4	7800	1160.6
CR36A	CR3	6	16.7	3330	1154.6	4310	1155.5	5180	1156.2	6010	1156.9	7810	1158.0
CR37	CR3	6	Private Road - Low road - 1149.9 - Bridge deck - 1149.9 - Low steel - 1149.4										
CR38B	CR3	6	16.7	3340	1152.1	4320	1152.8	5190	1153.4	6020	1153.9	7900	1154.7

Continued



Table CR-1 Frequency-discharge-elevations, Cub Run - Continued  
South Fork Shenandoah River Tributaries, Rockingham County, Virginia

X-Sec	Profile		10-year			25-year			50-year			100-year			500-year		
	Photomap No.	Plate No.	DA (sq mi)	Disch. (cfs)	Elev. (ngvd)	Disch. (cfs)	Elev. (ngvd)	Disch. (cfs)	Elev. (ngvd)	Disch. (cfs)	Elev. (ngvd)	Disch. (cfs)	Elev. (ngvd)	Disch. (cfs)	Elev. (ngvd)	Disch. (cfs)	Elev. (ngvd)
CR39	CR3	6	16.9	3380	1136.6	4400	1137.5	5200	1138.0	6100	1138.7	8000	1139.7				
CR40	CR3	6 & 7	17.2	3410	1125.5	4450	1126.4	5210	1127.0	6200	1127.6	8100	1128.7				
CR41	CR3	7	18.1	3520	1115.2	4650	1116.0	5400	1116.5	6420	1117.3	8440	1118.3				
CR42	CR3	7	19.0	3610	1106.0	4790	1106.7	5610	1107.3	6600	1107.6	8600	1108.5				
CR43A	CR4	7 & 8	19.2	3650	1097.7	4800	1098.7	5680	1099.4	6700	1100.3	8800	1101.9				
CR44	CR4	8		State Rte. 865	- Low road - 1101.2	- Bridge deck - 1103.5	- Low steel - 1100.2										
CR45B	CR4	8	19.2	3660	1096.5	4810	1097.2	5700	1097.5	6710	1098.0	8810	1099.0				
CR46	CR4	8	19.6	3700	1086.2	4890	1087.2	5800	1087.7	6800	1088.4	8900	1089.6				
CR49	CR4	8	19.2	3710	1076.2	4910	1077.0	5860	1077.5	6880	1078.0	9000	1079.1				
CR48	CR4	8 & 9	21.5	3890	1064.1	5190	1064.7	6190	1065.2	6990	1065.5	9500	1066.3				
CR49A	CR4	9	21.7	3930	1056.8	5200	1058.1	6210	1058.7	7310	1059.5	9580	1060.8				
CR50	CR4	9		State Rte. 652	- Low road - 1056.3	- Bridge deck - 1060.2	- Low steel - 1059.0										
CR51B	CR4	9	21.7	3940	1055.3	5210	1056.4	6220	1057.0	7320	1057.7	9590	1058.9				
CR52	CR4	9	21.9	3980	1045.7	5220	1046.5	6230	1047.3	7380	1048.0	9600	1049.0				
CR53	CR4	9 & 10	25.6	4350	1038.1	5800	1039.5	6800	1040.1	8190	1041.0	10800	1042.5				
CR54	CR4	10	25.7	4360	1032.9	5810	1034.4	6850	1035.2	8210	1036.4	10900	1038.2				
CR55A	CR5	10 & 11	26.8	4500	1025.0	6000	1026.8	7000	1028.0	8600	1029.7	11100	1031.7				
CR56	CR5	11		State Rte. 651	- Low road - 1028.7	- Bridge deck - 1029.6	- Low steel - 1028.1										
CR57B	CR5	11	26.9	4510	1023.8	6010	1025.5	7010	1026.4	8610	1027.6	11110	1028.9				
CR58	CR5	11	27.0	4550	1017.5	6020	1019.2	7190	1020.0	8620	1021.3	11200	1023.1				
CR59A	CR5	11	27.1	*	*	*	*	*	*	*	*	*	*				
CR60	CR5	11		State Rte. 650	- Low road - 1009.4	- Bridge deck - 1009.6	- Low steel - 1008.1										
CR61B	CR5	11	27.2	*	*	*	*	*	*	*	*	*	*				

Jct w/South Fork Shenandoah River - See SFSR photo map sheet 12 of 25

\*Stages on main stem South Fork Shenandoah River override those on Cub Run.

Table CR-1 Frequency-discharge-elevations, Big Run  
South Fork Shenandoah River Tributaries, Rockingham County, Virginia

X-Sec.	Photomap No.	Profile Plate No.	10-year			25-year			50-year			100-year			500-year		
			DA (sq mi)	Disch. (cfs)	Elev. (ngvd)	Disch. (cfs)	Elev. (ngvd)	Disch. (cfs)	Elev. (ngvd)	Disch. (cfs)	Elev. (ngvd)	Disch. (cfs)	Elev. (ngvd)	Disch. (cfs)	Elev. (ngvd)	Disch. (cfs)	Elev. (ngvd)
22	CR5	1	13.22	4090	1087.4	5710	1088.4	6950	1088.9	8090	1089.4	10950	1090.7				
23	CR5	1	13.40	4130	1071.5	5760	1072.7	7010	1073.3	8170	1073.9	11050	1075.0				
24	CR5	1&2	13.60	4170	1054.6	5820	1055.1	7090	1055.4	8250	1055.6	11165	1056.2				
25	CR5	2	13.80	4220	1033.0	5880	1033.6	7160	1033.8	8300	1034.1	11280	1034.7				
26A	CR5	2	13.90	4240	1025.5	5910	1025.9	7190	1026.1	8380	1026.2	11330	1026.8				
27R	CR5	2	State Route 340 - Low road					1021.0 - Low steel					1030.0				
28B	CR5	2	13.90	4240	1021.3	5910	1021.8	7190	1022.1	8380	1022.4	11330	1023.0				
29	*		14.00														
30A	*		14.20														

\* Stages on main stem South Fork Shenandoah override those on Big Run

Table CR-2 Benchmark descriptions, Cub Run - Big Run Rockingham County, Virginia - 1980

<u>B.M. No.</u>	<u>Photo Sheet No.</u>	<u>Description, location and elevation Cub Run</u>
21	5	SCS TBM - A square chiseled on the upstream (southwest) corner of of bridge over Cub Run on State Route 650 near the Junction of Old Harrisonburg Power Plant race with Cub Run. Elevation 1008.07
24	5	SCS TBM - A square is chiseled on the upstream (southwest) abutment of steel bridge over Cub Run on State Route 651. Elevation 1027.92
49	3	SCS TBM - a square is chiseled on the upstream (southwest) corner of State Route 652 bridge over Cub Run. Elevation 1060.35
46	4	SCS TBM - A square is chiseled on the downstream (northeast) abutment on State Route 672 bridge over Cub Run, approximately 1 mile southwest of Montevideo High School. Elevation 1103.91
TT-13T	3	USC & GS BM - Approximately 1.2 miles east along the C&W Railway from the Penn Laird Post Office, Rockingham County, 32 feet southwest of the crossing of State Route 842 and 2 feet northeast of a fence. A standard disk stamped "TT-13T 1930" and set in top of a concrete post. Elevation 1186.99
39	3	SCS TBM - A square chiseled on the west end of concrete island at Junction of U.S. 33 and State Route 655 and approximately 100 feet east of an Exxon station. Elevation 1181.14
GG-96	2	USC & GS BM - At Penn Laird, Rockingham County, in the brick wall of the Penn Laird Post Office, 8 inches south of the northeast corner, and about 4 feet above the ground, a standard disk stamped "GG-96 1935" and set vertically. Elevation 1211.15

Note: Elevation in feet above National Geodetic Vertical Datum of 1929.



Table CR-2 Benchmark descriptions, Cub Run - Big Run Rockingham  
County, Virginia - 1980 - Continued

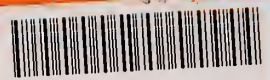
<u>B.M. No.</u>	<u>Photo Sheet No.</u>	<u>Description, location and elevation</u>
		Cub Run
34	2	SCS TBM - An aluminum disk in the end of a Railroad cross tie approximately 100 feet north of a cleared field and approximately 600 feet south of BM D-255, near cross section 22. Elevation 1252.56
30	1	SCS TBM - A square chiseled on top of the downstream (west) wall of the bridge over Cub Run on State Route 685, on the road to Massanutten Caverns. Elevation 1320.27
33	1	SCS TBM - A square chiseled on the downstream concrete headwall of the low water bridge over Cub Run on State Route 758 for cross section 10. Elevation 1399.26
		Big Run
2	BR-2	SCS TBM - A square chiseled on the left upstream (southeast) corner of the concrete bridge over Big Run on highway 340. Elevation 1029.90
4	BR-4	SCS TBM - A SCS disk in the base of a 6 inch gate post along a lane, approximately 400 feet upstream from large poultry farm.







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